

the standardisation of lathe and planer tools on a large scale. A central tool-dressing plant has been established recently at the Philadelphia Navy Yard, which supplies high-speed lathe and planer tools to all navy yards on the Atlantic coast. These tools are forged, treated, and ground to standards. Each of the various yards is equipped for re-grinding the tools until they require re-dressing, when they are returned to the central tool-dressing plant at Philadelphia for replacement by newly dressed tools. The advantages of this system are that all yards are equipped with tools of standard shapes and of uniformly high quality, and as the forging, dressing, and grinding of tools are done in large lots, substantial reductions in cost result.

THE necessity for keeping records of the steam consumption in the various prime-movers in use in large factories and generating stations has given a stimulus to the development of means of measuring and recording automatically the flow of water. In the Lea water-recorder, illustrated in *Engineering* for August 13, advantage is taken of the accuracy of the Thompson V-notch, the magnitude of the angle of the notch being selected to suit the flow. The recording arrangement consists essentially of a float having a vertical rod attached to it; a rack on this rod gears with a pinion fixed to the spindle of a horizontal drum. The angle of rotation of this drum will therefore be proportional to the head of water over the notch. A spiral wire coil or screw thread is wound round the drum, and has a contour similar to the curve of flow for the notch, this curve being plotted with head for abscissæ and gallons or pounds per hour for ordinates. A bar capable of sliding parallel to the axis of the drum is actuated by the spiral on the drum, and has an arm carrying the recording pencil. The movement horizontally of the pencil will therefore be a measure of the quantity of water flowing per hour. The record is made on a chart wrapped round a drum which is clock-driven; hence the total flow in a given time is easily ascertained by means of a planimeter. The makers are the Lea Recorder Company, 28 Deansgate, Manchester.

THE tenth edition of Messrs. Townson and Mercer's catalogue of scientific apparatus for physical laboratories should prove of service to science masters and others. The volume runs to 413 large pages, and contains well-illustrated information of a great variety of instruments designed to be of assistance in giving instruction in all branches of physics. Some parts of the catalogue, with their full descriptions and well-executed drawings of important pieces of apparatus, partake of the character of a practical textbook of physics. Teachers in charge of physical laboratories should see that a copy of the catalogue is added to their works of reference.

WE have received from the Geographical Model Works, Middlesbrough, a photograph of a hypsometrical model of the district of Ingleborough, near Settle, by Mr. J. Foster Stackhouse. The model is said to be correct within 2 feet of the actual district dimension at every part. The area covered is 42 square miles, and the horizontal scale 6 inches to a mile. Vertically, the measurements are one-sixteenth of an inch to every 25 feet. The model is built up of a series of ninety-four layers of cardboard, and between 500 and 600 pieces were used in its formation. The weight of the model in its complete state is above a hundredweight and a half. Accurate full-size copies of the model are now available, and particulars concerning them may be obtained on application to the offices of the Geographical Model Works at Emerson Chambers, Blackett Street, Newcastle-on-Tyne.

NO. 2078, VOL. 81]

## OUR ASTRONOMICAL COLUMN.

COMET 1909b (PERRINE'S, 1896 vii.).—The re-discovery of Perrine's, 1896 vii., comet by Herr Kopff is confirmed by a notice in No. 4347 of the *Astronomische Nachrichten*, where it is stated that perihelion passage should occur about October 31.35 (Berlin M.T.). This comet, according to Herr Ristenpart, passed through perihelion for the first time since its discovery in 1896, in April, 1903, but, owing to its small angular distance from the sun, was not found at that return. According to an ephemeris given by Prof. Kobold in No. 4348 of the *Astronomische Nachrichten* (p. 62, August 18), the position of the comet on August 26 will be  $\alpha = \text{oh. } 49.3\text{m.}$ ,  $\delta = +42^\circ 35'$ , and it is travelling in a direction parallel to, and slightly north of, the line joining  $\nu$  and  $\delta$  Andromedæ; since its discovery on August 12 the magnitude has increased 0.5. A photograph of this object was obtained at Greenwich on August 14.

THE RECENT PERSEID SHOWER.—Further observations of the recent display of Perseids are published in the *Yorkshire Weekly Post* for August 21 by Mr. J. H. Elgie, of Leeds. A number of bright meteors was seen by him, between 11 p.m. and midnight, on August 11, and he gives the positions of the limits of their tracks. The brightest object seen appeared at 11.30, and, increasing in brightness, travelled from  $210^\circ, +35^\circ$  to  $222.5^\circ, +10^\circ$ . A number of the meteors observed appeared to radiate from a small group of stars which includes  $\beta$  and  $\xi$  Draconis. A party of four observers at Sandfield, Moor Allerton, saw 105 meteors between 11h. and 11h. 45m. p.m. on August 11, and one of the party, Mr. J. C. Jefferson, considers it the finest display he has seen since 1866. Another observer, Mr. E. Hawks, of Leeds, recorded 175 meteors between 9 p.m. on August 11 and dawn on August 12.

THE SPECTROSCOPIC BINARY  $\beta$  ORIONIS.—The radial velocity of Rigel was first determined at Potsdam in the years 1888–91, and variability was suspected, but the measures were not sufficiently definite to confirm the suspicion. Similarly, Frost and Adams obtained a range of about 8.5 km., and Campbell and Curtis suspected one of 10 km., but in neither case were the results considered sufficiently definite to affirm the variability of the velocity. Results now published, by Mr. J. Plaskett, in No. 1, vol. xxx., of the *Astrophysical Journal* (July, p. 26), show, however, from 275 plates taken on fifty-five nights in 1908–9, that the star is probably a binary, with a period of velocity-variation of about 21.90 days. There is, further, a variation of amplitude which suggests the interference of a third body, and may account for the difficulties encountered by the previous observers, but more evidence must be obtained before this can be considered certain.

The elements now published give the eccentricity as  $0.296 \pm 0.059$ , the range of velocity as  $+26.09$  km. to  $+18.55$  km., the velocity of the system as  $+22.616 \pm 0.158$  km., and the length of the semi-major axis of the orbit as 1,108,900 km. These results are based on the measures of the three lines Mg  $\lambda 4481$ , He  $\lambda 4472$ , and H $\gamma$   $\lambda 4341$ .

EPHEMERIS FOR COMET 1909a (BORRELLY-DANIEL).—An ephemeris for comet 1909a is published by Dr. M. Ebell in No. 4347 of the *Astronomische Nachrichten* (p. 42, August 13). As the present brightness is given as 0.07, that at discovery being taken as 1.0, it is unlikely that this object will be observed again except with the largest telescopes or by photography.

MAXIMUM OF MIRA, 1908.—Mr. Naozo Ichinohe, having observed the magnitude of Mira Ceti during the period which included the last three maxima, publishes the results of his observations in No. 4346 of the *Astronomische Nachrichten*, the measures made during the period October, 1907, to February, 1909, being given in detail. The following table shows the observed dates of, and magnitudes at, the maxima, and compares the dates with those calculated by Guthnick:—

Guthnick	Observed date	Magnitude
1906, Dec. 19.6	Dec. 12	2.00
1907, Nov. 15.5	Nov. 1	3.60
1908, Oct. 11.3	Oct. 11	3.33

THE ASSUMED PLANET, O, BEYOND NEPTUNE.—Replying to a criticism which appeared in the previous number, Prof. W. H. Pickering has a letter in the current number of the *Observatory* (No. 412, August, p. 326) in which he recounts some of his reasons for assuming the existence of a planet beyond Neptune, which is exercising a perturbative force on Uranus. After pointing out essential differences between the present problem and that which presented itself to Leverrier and Adams, Prof. Pickering states that in the observations of Uranus he finds six distinct deviations from the computed course of the planet which occur where they should if produced by such a perturbing body as his assumed planet O; without the assumption three must remain unexplained. He then points out that the Greenwich observations of the last ten years show a steadily increasing deviation from those of the previous sixty years, a deviation which he considers is, of itself, a strong argument in favour of the existence of a hitherto unrecognised disturbing force.

With regard to the suggestion, made in *NATURE* for June 17, that the time is ripe for the discussion of the observations of Neptune, for the determination of any perturbing influence, Prof. Pickering suggests that such a discussion would probably be more hopeful in twenty years' time, when the deviations of Neptune should amount to two or three seconds. Another maximum of Uranus will occur about then, and a graphical solution would be likely to furnish trustworthy data concerning the perturbing force, or forces, very quickly.

#### AGRICULTURE IN THE TRANSVAAL.

THE issue of the annual report of the Transvaal Department of Agriculture is an important event in the agricultural world, and each year's report furnishes fresh proof of what science can do for agriculture. The work has outgrown the accommodation, and Mr. Smith puts in a strong plea for buildings which, in the Transvaal, is not likely to be disregarded.

An account is given by the heads of the separate departments of the work that has been going on. Dr. Theiler reports further experiments with *Piroplasma mutans* and *P. bigeminum*, two organisms causing serious animal diseases, and is making considerable progress with inoculation methods of coping with them. The botanical division, under Mr. Burtt-Davy, has occupied itself with the improvement of the seed maize. Already the Transvaal farmer exports maize, and could export more; he would secure higher prices and greater profits if supplies of trustworthy seed were available. New and promising plants have also been investigated, and one or two appear as if they will be useful, especially the Florida beggar weed, a leguminous plant suitable for the bushveld, and much liked by stock.

The plant pathologist, Mr. Pole Evans, finds that the potato-rot fungus, *Nectria solani*, Pers., hitherto regarded as a saprophyte, is, in the Transvaal at any rate, an active parasite, attacking the tubers at all stages of growth, and causing a putrid rot in them while still in the soil. Infected potatoes are not admitted into the Transvaal, and steps are being taken to eradicate the disease, but the other South African colonies are doing nothing to prevent the disease from establishing itself within their borders. A uniform system of dealing with plant diseases will be not the least among the advantages of unification.

Locust destruction has received much attention from the Entomological Division. There was a serious invasion of brown locusts, doing damage estimated at about 1,000,000*l.*, but the swarms were marked down, and the voetgangers destroyed by spraying with sodium arsenite solution. Unfortunately, some of the farmers and many of the natives are still indifferent about the work, and look upon locusts as a scourge against which it would be impious to contend; thus places where eggs are laid are not always notified.

There is also a general rise in the standard of agriculture in the colonies, in which the experimental farms of the department have played a conspicuous part. An increased area of land has come under the plough. Thrashing

NO. 2078, VOL. 81]

machines are being used more commonly; wheat is being taken up. The quality of the live stock is improving; there is a large demand for well-bred animals, and competition for the pedigree stock raised on the Government farms is very keen. Some farmers are interesting themselves in ostrich farming, which is likely to be a valuable industry in some parts of the colony, where the wild birds are fairly numerous.

Altogether the record is a highly satisfactory one, and the director, Mr. F. B. Smith, and the staff, are to be congratulated on what they have accomplished.

#### SPONTANEOUS COMBUSTION.

DR. JOHN KNOTT has published in the *New York Medical Journal* (April 17 and 24) an article on spontaneous combustion, with the object of showing that the cases of death reported as occurring from that cause are mere fancy legends which were partly the result of ignorance and mainly of imagination. Many years ago Liebig, and later Casper, wrote treatises with the same object; but Dr. Knott's contribution is not devoid of interest, if only for the exhibition of gentle sarcasm with which he attacks the writings and statements of past Fellows of the Royal Society and others of equal standing who lent the sanction of their names to these idle fables. He does not include among his cases the one which is probably best known to English readers, namely, the celebrated case of Mr. Krook recorded by Dickens in "Bleak House." The evidence in favour of spontaneous combustion as the cause of Mr. Krook's death is just about as convincing (or the reverse) as in the majority of the others.

We fancy, however, that Dr. Knott is preaching to the converted, for we can hardly believe him when he states that "spontaneous combustion is still accepted as an article of pathological faith by our recognised leaders in the domain of medico-legal opinion and teaching."

The belief in spontaneous combustion in the human body doubtless originated in the observation of electrical phenomena long before electricity was understood or even discovered. The "will-of-the-wisp" was endowed, as its name suggests, with a personality. The saintly halo and the fiery tongues of painters and poets familiarised the onlooker with imaginary exhalations; the easy combustibility of certain organic substances, the occurrence of phosphorescence in the sea and in decaying organisms, were then mysteries which combined to lend credence in an unusual combustibility of the human frame in those inclined to believe in the miraculous on the slenderest of evidence.

This point of view was accentuated and stimulated by the discovery of a new element, phosphorus, especially as it was first isolated from human urine and bones. The discovery of phosphorus in its day excited just the same kind of interest and imaginative thought as the discovery of radium is doing at the present time.

#### ETHNOLOGY IN AMERICA.

THE American Ethnological Society has reprinted in facsimile the first part of their *Proceedings*, originally published in 1853. The most interesting article is that contributed by W. Bartram, which was written in 1789, entitled "Observations on the Creek and Cherokee Indians," being replies to a series of ethnological questions prepared by Dr. B. S. Barton, vice-president of the Philosophical Society of Philadelphia. The connection of this tribe with the Iroquois, of whom they formed the southern branch, has now been established by Horatio Hale and Gatschet. This paper gives a singularly interesting account of the ethnography of a tribe now practically extinct, describing their probable origin, relations with other tribes, their picture records, religious beliefs, forms of tribal government, physical characteristics, social relations, their "Chunky-yards" or earthworks, tenures of land and conditions of property, diseases and their remedies, food and means of subsistence. In connection with the divine kings of Prof. J. G. Frazer, it is interest-